CLAIMS

What is Claimed Is:

1. A biocompatible implant for surgical implantation comprising:

a matrix comprising a resorbable thermoplastic-ceramic composition, the matrix having a pore size and porosity effective for enhancing bone growth adjacent the composition,

wherein the implant provides mechanical support for natural bone structure for a predetermined period of time to allow the natural bone structure to grow adjacent the material.

2. The implant of claim 1 wherein the natural bone structure substantially replaces the implant after a predetermined time.

3. The implant of claim 1 wherein the matrix includes a polymeric material selected from the group consisting of polymethylmethacrylate, polybutyleneterephthalate, and polyethyletherketone and combinations thereof.

4. The implant of claim 3 wherein the implant also includes a growth-enhancing composition for stimulating new tissue growth at the site of implantation.

5. The implant of claim 4 wherein the resorbable material degrades upon implantation at a first rate to provide load-bearing support for a predetermined period of time and the growth-enhancing composition degrades upon implantation at a second rate faster than the first rate to stimulate new tissue growth on the implant.

6. The implant of claim 4 wherein the growth-enhancing composition includes a biocompatible polymer-ceramic composition and a calcium source.

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7. The implant of claim 6, wherein the growth-enhancing composition further comprises one or more transforming growth factors.

8. The implant of claim 6 wherein the polymer-ceramic composition is selected from the group consisting of polycaprolactone, copolymers of polylactic acid and-polyglycolic acid, linear aliphatic polyesters, and blends thereof.

9. The implant of claim 4 wherein the growth-enhancing composition is blended with the resorbable material of the body.

10. The implant of claim 6 wherein the calcium source is calcium sulfate in fibrous form and wherein the calcium source is blended into the resorbable material.

11. A biomedical implant comprising:

a porous structure formed from a thermoplastic material and having a porosity between about 25% to about 70% by volume and a pore size between about 100 to about 2400 μm; and

a ceramic composition for enhancing the rate of bone growth, wherein the composition coats at least a portion of the structure or fills at least a portion of the pores of the structure.

12. The implant of claim 11 wherein the thermoplastic material is a resorbable material that degrades at a first rate to provide load-bearing support for a predetermined period of time and the ceramic composition degrades at a second rate faster than the first rate to stimulate initial tissue growth on the implant.

13. The biomedical implant of claim 11 wherein the structure has a porosity between about 50% to 60% by volume and a pore size between about 150 to about 400 μm.

14. The boimedical implant of claim 11 wherein the porous structure is selected from the group consisting of polymethylmethacrylate (PMMA), polybutylene-terephthalate (PBT), polyethyletherketone (PEEK), polyethyleneterephthalate (PET), high molecular weight polyethylene with hydrogel filling and combinations thereof

15. The biomedical implant of claim 11 wherein the ceramic composition includes a polymer and a calcium source.

16. A method of fabricating a biomedical implant comprising the steps of:

(a) forming a feedrod from a polymer composition selected from the group consisting of polymethylmethacrylate, polybutyleneterephthalate, and polyethyletherketone;

(b) passing a first amount of the feedrod through a dispensing head and onto a working surface in a predetermined pattern to form a first layer of the polymer composition on the surface;

(c) passing a second amount of the feedrod through the dispensing head and onto the previously-formed first layer in a predetermined pattern to form a multilayer object having a predetermined porosity; and

(d) applying onto the multiplayer object a biocompatible composition in an amount effective for enhancing bone growth to provide a porous implant object.

17. The method of claim 16 wherein the porous implant object is heated for a time and at a temperature effective for annealing the object.

18. The method of claim 16 wherein a thin, flexible material is wrapped around the porous implant object and a vacuum applied to provide an outer covering for holding the biocompatible composition on the multiple layer object.

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19. The method of claim 16 wherein the multiplayer object has a porosity of between about 25% to about 70% by volume and a pore size between about 100 to about 2400 μm.

20. The method of claim 16 wherein the biocompatible composition includes a ceramic composition selected from the group consisting of polylactic acid, polyglycolic acid, polylactic acid-polyglycolic acid copolymer, polycaprolactone, and combinations thereof.

21. The method of claim 20 wherein the biocompatible composition further comprises a calcium source.

22. The method of claim 21 wherein the ceramic composition and the calcium source are blended at ratios of between about 1:1 to about 1:5.

23. The method of claim 16 wherein the viscosity of the polymer composition is between about 100 to about 500 centipoise at temperatures between about 80° to about 100°C.

24. An implant formed by the method of claim 16.

25. A method of repairing or replacing tissue comprising the steps of:

forming a biocompatible substrate including a polymer composite selected from the group consisting of polymethylmethacrylate, polybutyleneterephthalate, and polyethyletherketone and a growth-enhancing composition including a ceramic composition selected from the group consisting of polylactic acid, polyglycolic acid, polylactic acid-polyglycolic acid copolymer, polycaprolactone, and combinations thereof, wherein the biocompatible substrate has a porosity effective for enhancing new growth of bone and tissue; and

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surgically implanting the biocompatible substrate in vivo at a desired site of repair to provide a foundation for new bone and tissue growth.

26. The method of claim 25 wherein the biocompatible substrate is a resorbable material that degrades at a first rate to provide load-bearing support for a predetermined period of time and the growth-enhancing composition degrades at a second rate faster than the first rate to stimulate initial tissue growth on the substrate.